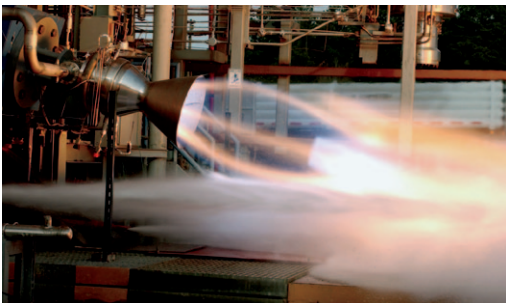
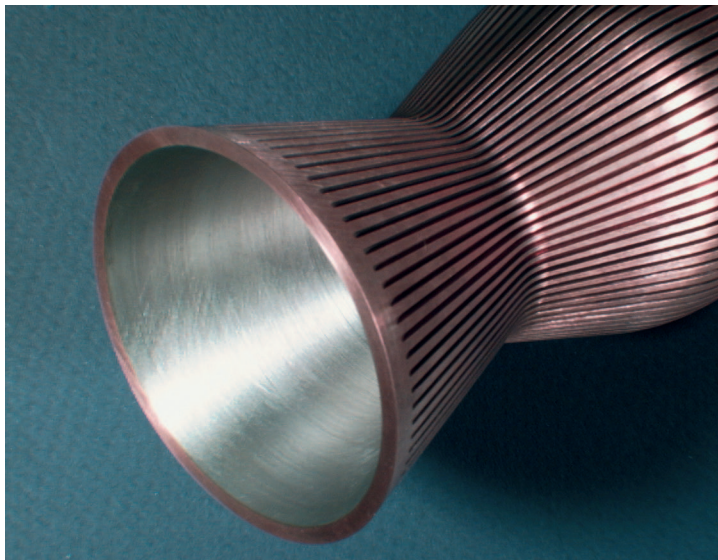


NASA's Marshall Space Flight Center and Plasma Processes Partner on Advanced Propulsion Technologies

Partnership improves the performance and safety of next-generation rocket engines



NASA photos



A long-standing partnership between NASA's Marshall Space Flight Center and Plasma Processes, LLC (Plasma), a small business based in Huntsville, Alabama, has resulted in several important innovations in rocket propulsion. This ongoing collaboration, funded by the Small Business Innovation Research (SBIR) program, has led to the development of advanced liquid rocket engine liners and coating materials that dramatically improve the performance, longevity, and safety of rocket engine combustion chambers. NASA researchers are now using these innovations to develop next-generation vehicles for space exploration, furthering progress toward safe, reliable, and affordable commercial space transportation systems.

Benefits of Technology Transfer

- Plasma's advanced robust liquid rocket engine liners offer increased mission life and reduced fabrication time, saving money for NASA and U.S. taxpayers.
- Plasma's SBIR-developed innovations have been used by many government agencies (e.g., the Navy and the Air Force) and major companies in the commercial aerospace community, including Aerojet, Honeywell, Alliant Techsystems Inc., and SpaceX.
- Plasma has sold over \$5 million worth of products and services based on technologies developed from the SBIR partnership.
- NASA and Plasma are helping to develop and mature rocket engine systems that will enable commercial services to transport crew and cargo to the International Space Station and low Earth orbit, strengthening the nation's space program and making it easier for U.S. businesses to develop commercial rockets and spacecraft.

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On the Record

“NASA is very proactive in developing and evaluating new technologies for extreme environments. Our partnership with NASA has been a tremendous benefit in developing and testing new materials and coatings for commercial applications.” —*Tim McKechnie, President, Plasma Processes*

“For nearly 20 years, Plasma has provided numerous innovations through all phases of the SBIR and Small Business Technology Transfer (STTR) programs for several NASA Centers in the areas of propulsion and engine technologies. Plasma has set an example of how a small business can successfully utilize SBIR/STTR to develop viable technologies that not only benefit NASA, but other government agencies and private industry as well.” —*Virginia Lynn Garrison, SBIR Technology Infusion Manager, NASA’s Marshall Space Flight Center*

About Plasma Processes, LLC

Plasma is a small business, based in Huntsville, Alabama, specializing in the development and manufacture of high- and ultra-high temperature materials, coatings, netshape structures, and powder processing services. Formed in 1993, Plasma provides rocket engine components, high temperature materials, and complete surface coating solutions to commercial and government customers.

Technology Origins

Plasma and Marshall Space Flight Center have collaborated on a wide range of projects related to propulsion technologies. Plasma originally developed special coatings to protect NASA’s space shuttle engine combustion liners from damage, earning NASA’s “Turning Goals Into Reality” award for impacting mission affordability. Plasma later fabricated a revolutionary new iridium-rhenium combustion chamber for NASA’s Advanced Material Bipropellant Rocket (AMBR). This engine went on to set a performance record by demonstrating a specific impulse of 333.5 seconds, making it an ideal candidate for future NASA science missions as well as civil and commercial space programs. Plasma is currently developing a high-emissivity coating for NASA’s next-generation J-2X rocket engine nozzle extension. All of Plasma’s SBIR efforts have enhanced the performance, durability, and longevity of NASA’s rocket engines, while also generating significant commercial business for Plasma.

The Transfer Process

The partnership between NASA and Plasma was formed through the SBIR program, a competitive, awards-based program that encourages small businesses to participate in federal research and development efforts. The partnership began in 1993, when NASA funded Plasma’s first SBIR technology, Innovative Plasma Nozzle Techniques for Eliminating Overspray. The nozzle technology significantly improved coating quality, purity, and longevity, and this collaboration paved the way for additional SBIR contracts that enabled Plasma and NASA to develop several more advances in propulsion technologies.

Finding a New Use

Plasma has leveraged its NASA successes into other government-funded programs. The Department of Defense has used the NASA-based technologies for tactical missile propulsion and ballistic missile defense, while the Department of Energy has asked Plasma to apply the technology for coating nuclear fusion reactor components. Plasma’s advanced materials—originally developed for NASA—are also finding new applications in commercial industries as well, including medical devices, crystal growth, and solar.

Looking Ahead

NASA and Plasma are currently working under a Phase II SBIR contract to develop a high-emissivity coating for NASA’s next-generation rocket engine, the J-2X. Powered by liquid oxygen and liquid hydrogen, the J-2X relies on nearly a half-century of technological and manufacturing advances to deliver up to 294,000 pounds of thrust. Plasma is working closely with NASA to provide the advanced thermal coatings needed to ready the rocket engine for future exploration missions.

For More Information

If you would like more information about this technology or about other technologies available for license, please contact:

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